

WHAT IS CLAIMED IS:

1 1. A method for inspecting electronic components mounted on a
2 printed circuit board with a mounting substance, each of the components including
3 leads, endcaps or other interconnects, the method comprising:

4 imaging the components and the mounting substance on the printed
5 circuit board to obtain 3-D and 2-D data associated with the components and material
6 surrounding the components; and

7 processing the 3-D and 2-D data in combination to find the locations
8 of the components based on identified leads, endcaps, or other attributes as
9 differentiated from the mounting substance, circuit board and other material on which
10 the components are placed.

1 2. The method as claimed in claim 1 wherein the mounting
2 substance is solder paste.

1 3. The method as claimed in claim 1 wherein the mounting
2 substance is an adhesive.

1 4. The method as claimed in claim 3 wherein the adhesive is a
2 glue.

1 5. The method as claimed in claim 1 wherein the leads have feet
2 and wherein the step of processing includes the step of calculating centroids of the
3 feet.

1 6. The method as claimed in claim 1 wherein the leads have feet
2 and wherein the step of processing includes the step of calculating average height of
3 the feet.

1 7. The method as claimed in claim 1 wherein the step of
2 processing includes the step of calculating border violation percentage of the
3 mounting substance.

1 8. The method as claimed in claim 1 wherein the step of
2 processing includes the step of pruning the board.

1 9. The method as claimed in claim 1 wherein the step of
2 processing includes the step of pruning the leads from the mounting substance.

1 10. The method as claimed in claim 1 wherein the step of
2 processing includes the step of processing the 3-D data together with upper and lower
3 threshold values to find the locations of the leads and the mounting substance.

1 11. A system for inspecting electronic components mounted on a
2 printed circuit board with a mounting substance, each of the components including
3 leads, endcaps or other interconnects, the system comprising:

4 a 3-D scanner for imaging the components and the mounting substance
5 on the printed circuit board to obtain 3-D and 2-D data associated with the
6 components and material surrounding the components; and

7 a high-speed image processor for processing the 3-D data to find the
8 locations of the leads and the mounting substance and for processing the 2-D data
9 together with the locations of the leads and the mounting substance to distinguish the
10 leads from the mounting substance.

1 12. The system as claimed in claim 11 wherein the mounting
2 substance is solder paste.

1 13. The system as claimed in claim 11 wherein the mounting
2 substance is an adhesive.

1 14. The system as claimed in claim 13 wherein the adhesive is a
2 glue.

1 15. The system as claimed in claim 11 wherein the leads have feet
2 and wherein the high speed image processor also calculates centroids of the feet.

1 16. The system as claimed in claim 11 wherein the leads have feet
2 and wherein the high speed image processor also calculates average height of the
3 feet.

1 17. The system as claimed in claim 11 wherein the high speed
2 image processor also calculates border violation percentage of the mounting
3 substance.

1 18. The system as claimed in claim 11 wherein the high speed
2 image processor also prunes the board.

1 19. The system as claimed in claim 11 wherein the high speed
2 image processor also prunes the leads from the mounting substance.

1 20. The system as claimed in claim 11 wherein the high speed
2 image processor processes the 3-D data with the upper and lower threshold values
3 to find the locations of the leads and the mounting substance.

1 21. A method for inspecting electronic components mounted on a
2 printed circuit board with a mounting substance, each of the components including
3 a body and endcaps, the method comprising:

4 imaging the components and material surrounding the components to
5 obtain 3-D and 2-D;

6 processing the 2-D and 3-D data to find locations of the endcaps; and
7 further processing with the 2-D data to isolate the endcaps from their
8 bodies.